Creatine monohydrate is most widely available and supplement of choice for many athletes in order to improve their sports performance. Its ergogenic efficacy and safety profile make this nutritional supplement one of the most researched supplement in sports science.

Since 1920, the importance of creatine monohydrate supplementation have been studied. The exogenous ingestion of creatine is mainly used as ergogenic supplement because of its known fact to improve performance in muscular strength, enhance short burst of muscular endurance and improve training effectiveness.

Creatine is primarily located in skeletal muscle and their improve ments attributed due to increased skeletal muscle free creatine and phosphocreatine along with increased resynthesis of adenosine triphosphate, both of which enhance muscle strength and weightlifting performances.

Although several studies have evaluated effect of creatine suppleme ntion along with resistance training augments muscle strength and performances. Increase in muscle fiber (hypertrophy) and weight lifting performances have also been observed with creatine supplementation. This article reviewed various references of creatine supplementation and its efficacy on strength in athletes. A systemic review has been conducted on various clinical studies using PubMed and manual search as a source. This review showed that creatine supplementation has promising result in improvement of strength among athletes. The review also emphasizes on future thrust in areas of research on nutritional supplements to enhance performance in athletes.

**ABSTRACT**

Creatine supplementation is one of the most common and popular ergogenic aids among athletes. It is found that creatine supplementation along with resistance training augments muscle strength and performances. Increase in muscle fiber (hypertrophy) and weight lifting performances have also been observed with creatine supplementation. This article reviewed various references of creatine supplementation and its efficacy on strength in athletes. A systemic review has been conducted on various clinical studies using PubMed and manual search as a source. This review showed that creatine supplementation has promising result in improvement of strength among athletes. The review also emphasizes on future thrust in areas of research on nutritional supplements to enhance performance in athletes.

**KEYWORDS**

Creatine Supplement, Ergogenic Aids, Strength, Performance.

**INTRODUCTION**

Physical fitness is a state of health and well being. It is achieved through proper nutrition, moderate to vigorous physical exercise and sufficient rest. Lots of nutritional products are available in fitness industry. Athletes enhance their performance by various nutritional supplements like creatine, Beta-alanine, arginine.

Creatine monohydrate is most widely available and supplement of choice for many athletes in order to improve their sports performance. Its ergogenic efficacy and safety profile make this nutritional supplement one of the most researched supplement in sports science.

Since 1920, the importance of creatine monohydrate supplementation have been studied. The exogenous ingestion of creatine is mainly used as ergogenic supplement because of its known fact to improve performance in muscular strength, enhance short burst of muscular endurance and improve training effectiveness.

Creatine is primarily located in skeletal muscle and their improve ments attributed due to increased skeletal muscle free creatine and phosphocreatine along with increased resynthesis of adenosine triphosphate, both of which enhance muscle strength and weightlifting performances.

Although several studies have evaluated effect of creatine suppleme ntion along with resistance training augments muscle strength and performances but in India as sports science industry is slowly coming into prominences so very limited research work is carried out as of now. Therefore, the purpose of this review to evaluate efficacy of creatine supplementation on strength in resistance trained athletes.

**MATERIAL AND METHODS**

**EXCLUSION CRITERIA**

Articles related to older subjects with creatine supplementation along with resistance training are excluded in this study and studies of creatine supplementation efficacy along with protein or carbohydrate are also excluded.

This article reviewed various references of creatine supplementation and its efficacy on strength in resistance trained athletes. Studies showing creatine supplementation group and placebo group that performed same resistance training protocol are taken and then outcomes are compared in both the groups. So, 16 studies met the inclusion criteria (Table 1). Almost all studies used 1RM bench press test, Squat test, Leg press test as exercise protocol. Number of repetitions are also assessed using standard weight.

**TABLE 1: Effect on Muscle Strength and Weightlifting Performance following same Resistance training protocol on Creatine supplementation and Placebo Group**

<table>
<thead>
<tr>
<th>S. No</th>
<th>Subjects (Male)</th>
<th>Supplementation Duration</th>
<th>Period of Resistance Training</th>
<th>Exercise Protocol during supplementation</th>
<th>Control Group</th>
<th>Placebo Group</th>
<th>References</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>21</td>
<td>21 days</td>
<td>Untrained</td>
<td>3 weeks resistance training</td>
<td>Bench press - 11% increase</td>
<td>Bench press - 4% increase</td>
<td>6</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Leg press - 54% increase</td>
<td>Leg press -29% increase</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>16</td>
<td>84 days</td>
<td>Untrained</td>
<td>12 weeks</td>
<td>Leg press - 54% increase</td>
<td>Leg press - 29% increase</td>
<td>7</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>17</td>
<td>63 days</td>
<td>Resistance trained football players</td>
<td>9 weeks</td>
<td>Bench press - 5% increase</td>
<td>Bench press - No change</td>
<td>8</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Squat - 9% increase</td>
<td>Squat - 5% increase</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>30</td>
<td>28 days</td>
<td>Untrained</td>
<td>4 weeks</td>
<td>Bench press - 18% increase</td>
<td>Bench press (9% increase</td>
<td>9</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Leg press - 42% increase</td>
<td>Leg press - 16% increase</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>21</td>
<td>37 days</td>
<td>5 years</td>
<td>8 weeks</td>
<td>Bench press - 9% increase</td>
<td>Bench press (7% increase</td>
<td>10</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Leg press - 17% increase</td>
<td>Leg press - 8% increase</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Bench press repetitions - 16% increase</td>
<td>Bench press repetitions (4% increase)</td>
<td></td>
</tr>
</tbody>
</table>
RESULT
Several studies have evaluated the combined effect of creatine supplementation and resistance training on muscle strength and weightlifting performances. Of the 16 studies reviewed, the average increase in muscle strength following creatine supplementation plus resistance training is greater than average increase in muscle strength in placebo. There is greater increase in weightlifting performances too. Thus, there is significant improvement in muscle strength and weightlifting performances after creatine supplementation in concomitant to resistance training.

CONCLUSION
The study has shown that creatine is a potential ergogenic nutritional supplement among athletes. Evidence proved that creatine supplementation during resistance training improves muscle strength and performances. A large number of studies are published on creatine but still we cannot explain the mechanism by which it affects strength is unclear as uncertainty remains due to dosage strategies, exercise protocols and individual variability.

REFERENCES
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